A MOBILE HOME PARK FOR PERMANENT RESIDENTS

by

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STATEMENT OF PROBLEM

The purpose of this study is to show that mobile homes, properly located in a well planned mobile home park can provide an attractive, functional home for residents, and that the park can be an asset to the community in which it is located. The success or failure of the mobile home park depends primarily upon proper design of the park and the space upon which the mobile home is placed, as well as the location of the park in the community.

INTRODUCTION

The mobile home, formerly known as the house trailer, has undergone many changes during the past three decades. New designs and manufacturing techniques have resulted in a new definition for the term "mobile home". This and several additional terms frequently used in the industry and in this thesis are as follows:

> Mobile Home. A single-family dwelling designed for transportation after fabrication on streets and highways on its own wheels or on flatbed or other trailers, and arriving at the site where it is to be occupied as a dwelling and complete and ready for occupancy, except for minor and incidental unpacking and assembly operations, location on jacks or permanent foundations, connection to the utilities and the like (2).

Mobile Home Park (or Court). "A parcel of land under single ownership which has been planned and improved for the placement of mobile homes for non-transient use (10)."

Space (or Lot). "A parcel of land rented for the

exclusive use of the occupants of a single mobile home (10)."

This study presents a short history of the mobile home industry to illustrate its scope and impact as it applies to housing in the United States. Public acceptance of mobile homes and possible means for improving this acceptance through planning controls and design are discussed.

The design of a mobile home park as it applies to a specific site chosen for the project is presented. The park is considered to be a housing type park in that it will primarily serve employed people, students and military personnel (15). This type is usually characterized by lower rents, fewer and less elaborate facilities and smaller spaces than other types of parks. It was felt, however, that in this case larger spaces were desirable because of increased mobile home sizes, esthetic considerations and low land cost. The project is classified as a park for permanent residents because, according to Bartley and Bair (5), permanent residents are those who will occupy the same location for one year or longer. The park location is also permanent, since the site is not likely to be subjected to changing land use. Descriptions and illustrations of the various elements of the park and individual spaces are presented, with an explanation of why and how each element was treated. A general cost estimate, list of expenses and table depicting possible returns on investment are included to complete the comprehensive study.

A BRIEF HISTORY OF THE MOBILE HOME INDUSTRY, ITS PRESENT AND FUTURE STATUS

The first company to mass produce mobile homes was the now defunct Covered Wagon Company of Detroit, Michigan, in 1933.

The government recognized the significance of the industry during World War II, when it purchased 38,000 twenty-five foot trailers to house workers near war production centers. In 1941, the average size range of these trailers was fifteen to twenty-two feet long and six to six and three-quarters feet wide (5). Due to their mobility and limited size, "house trailer" was accepted nomenclature for the units at that time. They contained no baths and were referred to as dependent units, since they required separate bath and restroom facilities.

Prior to 1940, the industry had produced a total of approximately 10,000 trailers. The postwar housing shortage caused an acceleration in production and in 1947, 60,000 units were manufactured. Baths, kitchens and hot water units were popular in the larger models, and the average size was increased to a length of twenty-seven feet and a width of eight feet (3).

When the production of "ten-wides", ten-foot-wide units, was begun in 1954, there was skepticism concerning marketability. In 1963, 99.4 percent of the units supplied to dealers were at least ten feet wide and 20 percent were twelve-wides, expandable and double-wides.

The increase in width was not the only significant change. During the first quarter of 1960, 21 percent of all units produced were over fifty-five feet long. By 1963, this figure had

risen to 46.3 percent. The area was increased to a possible 800 to 1,440 square feet. This was a marked improvement over the 216 square feet of the twenty-seven by eight foot unit of 1947.

Size increase has resulted in a division of the units into two distinct classifications: mobile homes and travel trailers. A travel trailer is defined as a unit not exceeding twenty-nine feet in length or 4,500 pounds gross weight (18). This study will be confined to the discussion of mobile homes only.

This increase in size so greatly reduced the mobility of the units that, in 1959, a survey conducted by Michigan State University indicated that 50 percent of all mobile home owners hired a commercial hauler when they moved (14). A local park operator estimates that about 90 percent of the units pulled into his park are towed by commercial firms.

Currently over 4,100,000 persons live in mobile homes, with an average family size of two and nine-tenths persons (17). Since 1961, mobile homes have consistently accounted for 10 percent or more of the total number of non-farm conventional single-family housing starts. For the twelve month period ending February, 1963, this percentage was 12.6 (3).

The average length of stay in one location has increased to approximately thirty months (17), which compares favorably with apartment dwellers. According to the Bureau of the Census (26), 20 percent of the civilian population of the United States moves each year. This indicates that mobile home occupants only move twice as often as do those persons residing in conventional,

single-family dwellings.

There are approximately 15,000 mobile home parks in the United States and about 1,100 new parks are being built each year. In California there was a net increase of almost 20 percent from 1958 to 1962 (15). These parks are a considerable improvement over the "trailer camp" of the World War II era. Most of the parks today are designed by competent land planners and are built by qualified engineers and contractors. The gross density had decreased from an average of 18 to 20 spaces per acre to a present average of 10 to 12 spaces per acre. Provisions are made for recreation and social activities within most parks.

The physical size of parks varies from 30 or less spaces to 500 or more spaces. The average size of parks being built is 100 to 120 spaces. These parks represent an investment of from $100,000 to $500,000 each, with a few exceptions in the luxury class costing over $1,000,000. On a per space basis the cost is approximately $1,800 to $2,200. This does not include the cost of land, but covers such items as utilities, patios, streets, recreation facilities and a laundry building (25).

Table 1 is the result of a 1962 survey made by "Trailer Topics" Magazine and the Park Division of the Mobile Home Manufacturers Association. It should be remembered that the wider units did not make their appearance until 1956, and the number in existing parks at the time of the survey was quite small.

A recent Bank of America study predicts that mobile home

Table 1. A survey of mobile home parks.

State	No. of parks in survey	Average acreage	Average no. spaces	Average lot size	Median yr. of park
Minnesota	31	7	57	2,062	1953
Iowa	34	5	41	2,013	1954
Missouri	37	14	48	1,963	1952
No. Dakota	8	5	47	1,621	1953
So. Dakota	13	4	34	2,218	1952
Nebraska	15	5	48	2,032	1952
Kansas	22	4	37	2,122	1953
Average		7	45	2,004	1953

State	% of occupancy	% of 10-wides	% of 12-wides or larger	Av. no. of adults per mobile home	Av. no. of children per mobile home
Minnesota	90	59	1	1.8	.56
Iowa	89	48	1/3	1.8	.53
Missouri	90	59	1	1.9	1.05
No. Dakota	87	51	1/3	1.9	.61
So. Dakota	90	50	1/3	1.7	.86
Nebraska	93	46	1	2.0	1.15
Kansas	84	49	5	1.9	.73
Average	89	53	1	1.9	.78

sales in California can be expected to increase two to three percent annually for the rest of the decade (15). The trend toward expandable and twelve-wide units is expected to continue. Several companies are providing models that are separated for transporting and combine on the site to form a twenty foot by forty foot plus unit. At least one manufacturer is now producing a wheel-less "package" home with a variety of optional add-on rooms (3).

This increase in size will dictate a need for larger mobile home spaces than has currently been necessary. Mobile home

parks should be designed with some variety in size of spaces to accommodate this diversity in the design of modern units. Many new parks will be necessary to supply a location for the increasing number of mobile homes.

PUBLIC ATTITUDE TOWARD MOBILE HOMES

Popular Misconceptions

The mobile home industry has improved the design of its dwelling units significantly during the last three decades. The industry, however, has not met with complete public acceptance. Unfortunately, most persons voicing disapproval are not acquainted with the actual facts of mobile home living.

According to Bartley and Bair (5) there are six erroneous statements commonly levied toward mobile homes, whether in or out of a park.

"The Mobile Home Contains Equipment Making it Completely Independent of Urban Facilities". After considering information dealing with utilities presented later in this study it will be obvious that this statement is not true.

"Mobile Homes Spend Much-or Most-of Their Useful Lives on the Road". It has been stated that the average length of stay for a mobile home is about thirty months (17). This would hardly indicate that the units spend much time on the road. Increased size and expense of towing do not encourage frequent moves.

"The Mobile Home is Always and in Every Case Substandard Housing". The modern mobile home, though compact, is more efficient and represents a higher degree of planning than does the average conventional home. Its location in the community largely determines whether or not it is substandard housing. Properly placed in a well-designed mobile home park with adequate facilities it meets most conventional housing and building codes.

Since local inspection and enforcement of building codes is quite difficult, the Mobile Home Manufacturers Association and the Trailer Coach Association have adopted A.S.A. standards for installation of electrical, heating and plumbing systems. All units built to these specifications bear the MHMA-TCA seal with the wording "American Standard A 119.1". This provides local assurance that mobile homes built elsewhere are manufactured to exacting specifications.

"Mobile Home Dwellers are Predominantly in the Low-Income Brackets". Mobile home occupants are not generally in the lower income brackets. In 1963, 27 percent of all mobile home residents were skilled workers; 20 percent were professional people; 20 percent were retired people; 3 percent were students; and 12 percent were classified as miscellaneous, i.e., businessmen, semi-skilled laborers, etc. (17).

"The Mobile Home is a Tax Parasite". In some areas mobile home owners may not pay for their full share of the tax load.

It is the responsibility of local governments to find an equitable means of collecting taxes. In most cases the owner is assessed in various ways, such as special fees, personal property tax, licenses, service charges and others. In Kansas, mobile homes are taxed as personal property and a license is necessary when the unit is to be moved. A title of ownership is also required.

"The Mobile Home Depreciates Surrounding Property Values". This condition is primarily due to the unrestricted occurrence of single mobile homes on lots with conventional buildings. Through adequate zoning and the design of attractive parks, this problem could be eliminated. Adequate zoning does not imply the common practice of placing mobile homes in a business, commercial or industrial district. Any type of housing placed in this environment could become substandard.

Residential Versus Commercial Use

One of the primary reasons for zoning is to prevent mixed land use such as the encroachment of commercial or industrial uses on residential areas. Some zoning ordinances are being used to prohibit mobile homes from residential areas (9) (28). In Wichita, Kansas, 44 percent of the mobile home parks are in districts zoned for commercial purposes and 14 percent are in industrial districts (13).

The conditions leading to such prohibition are usually as follows (5):

Mobile Home Sales and/or Services are Often Carried on in Mobile Home Parks. This does not negate the fact that the remainder of the park is residential. These commercial uses, of course, should not be allowed in the park if it is located wholly in a residential district. Often this difficulty is overcome by allowing the park to overlap a commercial district, preferably along a major arterial way. This allows sales, service and even overnight parking of mobile homes in transit or travel trailers in one section of the park and the residential use in another. The residential area should be well buffered from the commercial area and should be served by private entrances so that the residents would not be forced to enter through the commercial section.

In Larger Parks, Goods are Often Sold on the Premises. This situation differs very little from the neighborhood shopping center located in a residential area and in many cases is better suited for the needs of the community. It is especially necessary in a service type park where the residents are predominately elderly. This inclusion in a mobile home park would closely resemble the community unit plan frequently used in conventional developments.

The Spaces are Rented. According to Hodes and Roberson (12),

> The residential character of a housing development where homes or apartments are leased is not rendered a business use for zoning purposes by reason of the fact that the owner operates the building or development for

> financial gain. Similarly, the essential residential character of a mobile home park should not be nullified for zoning purposes by reason of the fact that the park operates or leases space for occupancy by mobile homes.....

People should not be forced to live in commercial, industrial or business districts simply because they choose to live in mobile homes. This will only lead to inferior mobile home parks.

PUBLIC ACCEPTANCE THROUGH PROPER PLANNING CONTROLS

Once it has been established that mobile homes are residential in character, there is need for further refinement of the term residential. Are the mobile homes to be located only in mobile home parks, in multiple-family districts, or will single mobile homes be allowed in certain single-family districts?

Mobile Home Parks Only

There are certain requirements that should be stipulated if the mobile home is to be permitted only in a mobile home park.

Minimum Size of Park. This regulation is necessary to prevent parks of two or three units from being scattered throughout the district. This would negate the reason for requiring that they be in parks. Although the minimum would depend somewhat upon the surrounding properties, topography, economy, need and other local factors, a general acceptable minimum size is eight to ten acres or a minimum total of fifty spaces.

Minimum Size of Individual Spaces. To prevent overcrowding and to promote the health, safety and welfare of the occupants a maximum allowable density should be designated. There are various methods for achieving this, but the usual ways are to state minimum square footages per space, minimum distances between units, or maximum number of units per acre (gross density control). These standards vary depending upon the type of park desired, but definite minimums should be set. Minimums will not guarantee good design, but will help prevent substandard parks. The Mobile Home Manufacturers Association sets the absolute minimum space size at 1,500 square feet and a minimum space width of thirty feet or fifteen feet side-to-side and ten feet end-to-end. Bartley and Bair (5) suggest an absolute minimum of 2,000 square feet and a maximum density of ten to twelve spaces per acre. The Federal Housing Administration (10) specifies that the minimum distance from the non-entry side of a unit to another mobile home or building is twelve feet. The minimum distance from the entry side is twenty-four feet, from the rear ten feet and from the front of the unit twelve feet.

Buffering. The park should be buffered from the surrounding areas by means of a natural or artificial barrier, such as greenbelt planting strips, solid walls or fences, etc. The degree of treatment, of course, should be determined by the use of the adjacent land.

Single Mobile Homes Allowed

Existing Single Units in the District. In this instance the mobile homes are usually accepted by custom and usage and the solution might be similar to that used in Carbondale, Illinois (4).

a) Mobile homes and conventional homes are permitted as principle uses.

b) Both are required to be on lots of the same minimum frontage and area.

c) Only mobile homes meeting the MHMA-TCA standards for plumbing, heating and electrical systems are permitted.

d) All mobile homes are to be supported under all exterior walls by a permanent foundation and the wheels are to be removed to permit setting the unit lower.

e) Within six months, mobile homes are to be taxed as real property. (The removal of the wheels helps make this regulation enforceable.)

No Single Units Existing in the District. Under this condition, mobile homes would probably only be accepted if they looked enough like conventional homes. The ordinance permitting them in the district might be worded as follows:

Mobile homes will be permitted in the 2 R single-family residential district only if the end portions are at least twenty feet in width, the main body of the unit is at least fifty feet in length, the roof is pitched at a slope of not less

than three on one (three inches vertical rise in twelve inches horizontal distance) and the ridge is not less than ten feet from the front wall. The unit shall be oriented with its long axis parallel to the street and exterior finish shall be of a flat variety so as not to create excessive reflection. Colors used shall be the same as those generally used in the neighborhood.

This provision protects the health, safety and general welfare of the community by establishing a minimum of 1,000 square feet of floor area. It might also be defended on the grounds that it protects the character of the neighborhood.

Methods of Zoning Mobile Homes (2)

Permitted as Outright Use in Designated Appropriate Residential Districts. This is probably the most desirable method of zoning mobile homes because it allows for a variety of situations. The developer knows what he is allowed to do without lengthy negotiations with the planning commission, board of zoning appeals or the municipal governing body.

Permitted as a Special Exception in Designated Appropriate Districts. This method encompasses the same merits as above except that definite conditions are set up by the ordinance. These conditions must be met before mobile homes are allowed. This method is also less desirable than the first because it forces a special exception label on a use that is definitely residential in character.

Floating Zone. When this method is employed, a definite zone for mobile homes is not set until there is a need for such a zone. When a person requests that a district be designated, the planning commission selects an appropriate location. This method prevents over-zoning, however, the usual result is spot zoning several small districts.

Special Mobile Home District. It is difficult to foresee the area that will be required for this particular use. Designating a district to be used exclusively by mobile homes frequently results in over-zoning or a lack of adequate area.

Project Programming and Site Selection

Once the feasibility of the development of a mobile home park has been established, the preparation of a project program should be the first step. The program should be as detailed and complete as possible and should represent the total project, not preliminary stages only. Clients, planners in associated professions, maintenance personnel, mobile home park operators and anticipated project users should be consulted so that a thorough understanding of all phases of the project is more nearly assured. Past and present examples of similar installations are also valuable sources of information. Why were they successful or why did they fail?

"Those who refuse to learn the lessons of history are condemned to repeat it (21)."

The selection of the site is the next step in a logical

sequence of development. It is obvious that the site should not be subject to smoke, noxious odors, unusual noises, unstable soil conditions, flooding or infestations by insects or rodents. Further investigation of the conditions of the soil, ground water level, drainage, rock formations and topography should be undertaken. The relation of the site to community facilities and services such as shopping, churches, schools, employment, recreation areas, police and fire protection, streets, water, sewer, gas and electricity are also important considerations.

When the site has been selected, the applied design process can begin. This phase is discussed as it applies to the specific site chosen for this study.

DESIGN CONCEPT AND APPLICATION

Description of the Site

The twelve and one-half acre site selected for this study lies in Riley County, Kansas, immediately outside the northeast section of Manhattan, a second class city of approximately 25,000 population. (Fig. 3, Plate II) The area is a part of the flood plain of the Blue River; however, the erection of Tuttle Creek Dam about four miles upstream has alleviated all possibilities of inundation. The site is essentially level with only one and one-tenth feet fall from west to east. This represents a grade of .11 percent or .11 feet per 100 feet. (Fig. 1, Plate II) Drainage ways are located on both the east and west ends of the property. The soil is a fertile, clay-loam

silt that has been under cultivation for many years. No tree or native woody cover exists. Access is provided via Casement Road, a collector street, which lies adjacent to the west property line.

Community facilities include a shopping center three-quarters of a mile west, an elementary school within one-quarter of a mile, a four acre neighborhood park one-quarter of a mile west and two churches within three-quarters of a mile. Excellent family recreation facilities are available in the Tuttle Creek Reservoir area, four miles north on Casement Road.

Pedestrian and Vehicular Circulation

Primary consideration has been given to pedestrian circulation throughout the park. Laundry and recreation facilities are centrally located, only 500 feet from the farthest dwelling. Walks adjacent to the major streets are provided, but primary consideration is given to walks in the center of the blocks for a more enjoyable and, in some instances, more direct route. Focal points have been created with solar screens and plantings at the ends of these long vistas and trees overhead form a shady arch. All walks in the park are four feet in width and are lighted after dark for safety and convenience.

The basic street system is laid out in a rectangular pattern to best fit the rectangular site. Street pavement width is twenty-four feet and corners have been rounded to a thirty foot radius to provide adequate turning space for large mobile

homes and tow trucks. All spaces are oriented at a 60 degree angle to the centerline of the street so that a minimum effort is necessary to back the units onto the space. A special effort was made to prevent crossing large turf areas to place the units, since many moves will be made when soil conditions may not support their weight. Ten feet of additional width is supplied at the main entrance of the park to provide a place for arriving or departing units to stop at the office. All streets are well lighted for safe movement of vehicles and pedestrians after dark.

Parking has been provided in small bays to consolidate automobile storage and prevent the common practice of scattering them throughout the park. Each bay is paved to prevent the dust problem that gravel areas present and is located adjacent to the street to prevent the added expense of drives. Removing the parking from a position adjacent to the dwelling unit also permits a pleasing treatment of the facade and foreground and leaves more useable space where it is most needed. These added benefits do not sacrifice convenience, since no entrance is more than twenty-five feet from a parking stall. One nine by twenty foot stall is provided for each space and one extra stall is supplied for every two units to serve guest, service and second car parking requirements. Parking places are also provided at the laundry building and office. Storage for maintenance equipment and bulky tenant belongings is located in a screened and fenced area in the southeast corner of the park.

Grading and Drainage

The usual problem of creating a suitable street system without exceeding maximum grades or leveling off plateaus for structures was not the case with this site. The ground surface had to be manipulated by a series of cuts and fills to even create minimum grades. (Fig. 2, Plate IV) Since less grade is necessary to run water on paved surfaces, the street gutters were used as drainage ways and storm sewers were employed to take water from the low spots in the streets to a major drainage channel adjacent to the west side of Casement Road. The streets were generally graded to a minimum slope of one-half percent (1/2 foot fall per 100 feet) and turf areas were graded to a minimum slope of two percent (2 feet fall per 100 feet). The original drainage had been to the east rather than the west, but the ground only sloped .11 foot per 100 feet along the south property line and only .4 foot per 100 feet along the north property line. (Fig. 1, Plate II) To drain even one-half of the site to the east using the streets as drainage ways and a minimum slope of 1/2 foot per 100 feet would have required a six foot fill in the turf areas near the center of the site. Storm sewers could not be drained to the east because of a lack of sufficient outfall. Therefore, even though the east drainage way would have carried a greater volume, only about one acre was drained to it.

The drainage system (Plate IV) was designed on a twenty-five year frequency interval. The maximum rainfall intensity

for this interval is three inches per hour (27). Assuming a maximum distance of overland flow of 200 feet on an average grass surface at a two percent slope, the inlet concentration time was calculated at 16.7 minutes. From this information, an adjusted rainfall intensity of five and eight-tenths inches per hour was derived (22).

The volume of runoff was estimated by the rational formula (20):

Q equals ACI

in which Q equals the runoff from an area, in cubic feet per second.

A equals the area to be drained, in acres.

C equals the coefficient of runoff.

I equals the intensity of rainfall, in inches per hour. The coefficient of runoff was assumed to be 0.95 for roofs, patio surfaces, walks and street surfaces and 0.35 for all turf areas. The site was divided into nine drainage areas and the runoff from each area was calculated to determine the necessary sizes of storm sewer pipe.

Grading with a tolerance of one-tenth of a foot was required over the entire site because of the minimum slopes involved. The elevation of each mobile home space was established by two spot elevations in addition to the contour lines which were at one foot intervals. (Fig. 2, Plate IV) An excess cut of seven percent was allowed for an optimum balance of cut and fill. This excess compensates for soil shrinkage during

the grading operation (20).

Planting

Plant group arrangement was considered paramount to the design concept due to the flat, barren site. The esthetic qualities of form, texture, bark, bloom, fruit, fragrance and color of plants provide interest that cannot be supplied by static building materials. A few of the functions of carefully chosen, properly located plants include: reduction of heat and glare due to transpiration and shade (19), partial absorption of sound and protection from wind. Screening for privacy and for blocking undesirable views and softening harsh architectural lines are also important functions.

A buffer strip around the park (Fig. 2, Plate III) is composed of large shrubs, small and large deciduous trees and evergreen trees. The buffer serves as a partial windbreak for strong seasonal winds and insulates the park residents from future development of the adjacent property.

Variation in height and size of trees was employed to give the effect of an undulating ground surface, often taking advantage of slight changes in elevation to exaggerate this effect. A different species of trees predominates along each spur street in the north portion of the site to give the streets individual character. The same technique is employed to create variety along the longer east-west blocks. Shrubs and small ornamental trees are used to reinforce the tree masses, help

secure privacy and provide screening for undesirable views such as the storage lot and garbage collection areas.

Hardiness, low maintenance requirements and relative freedom from insects and diseases were also factors considered in plant selection. The plant list (see Appendix) itemizes all plants used for the project. The key symbol, botanical and common name, quantity, size and special instructions are listed for each plant (1). All plants should be sited in accordance with Plates III and V.

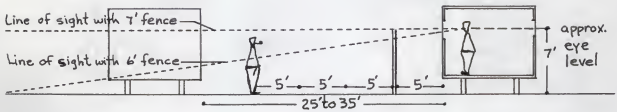
The Individual Space

The space in which each mobile home is located was treated as the basic unit of human environment in this study. It was of primary importance that the residents considered the space as a home rather than a parking place for their mobile home. The space was designed to appear permanent and to offer adequate amenities. An average area of 3,521 square feet was employed as compared to the usual size of 2,000 to 2,500 square feet. All spaces were designed to accept units twenty feet wide by sixty feet long. Seventy foot units can be placed in approximately 50 percent of the spaces.

The patios (Plate V) were placed so that they would not be covered by a unit of maximum size. Precast concrete steppers were used for all private walks to insure flexibility in the design of the space for various sizes and shapes of units. All permanent plantings, with the exception of the small shrubs in

front of the unit, are located so that they will not interfere with the mobile home when it is being moved on or off the space. Those plants in front of the unit are placed so that the wheels of the unit pass between them. If they are damaged, however, they can easily be replaced. Their primary function is to screen the tongue of the unit. An optional screening device is shown in Fig. 3, Plate V. Redwood stakes are driven into the ground to form a low barrier. These devices, together with skirting all sides, help fit the units to the site and are required of all residents to further achieve the permanent atmosphere. Planting areas adjacent to the unit are to be used for herbaceous plants such as flowers and ground covers. These plants are to be furnished by the residents at his discretion.

Privacy is secured with redwood fences, screen panels, hedges and plant masses. A seven foot height, rather than the customary six feet, is required to provide adequate screening. The additional height required to screen the outdoor living areas is due to the proximity of the units to one side of the space and the floor elevation of the mobile home (see sketch below).



Recreation

Outdoor recreation is an important consideration in all housing developments, especially one with a relatively high density. An attempt has been made to provide a limited recreation area on each individual space by using larger spaces, however, central recreation areas are also included.

That portion of the central area, labeled "recreation area" in Fig. 2, Plate II, is devoted entirely to a "playlot" or "tot lot" type of playground for preschool children. It contains approximately 5,000 square feet and includes imaginative play equipment such as play sculpture and other play apparatus. The area is completely fenced for the safety of the youngsters. The proximity of the playlot to the laundry building and its adjacent patio provides visual control for the mother as she does her washing or relaxes on the patio. Other recreation areas are treated as open, park-like spaces. They provide for passive recreation such as picnicking and strolling. These areas, including both active and passive recreation, represent a total of 36,850 square feet or .84 acre.

The buffer strips, common walks and office and laundry areas, which are included as open space, total 1.2 acres. Open space and recreation space account for two acres, or about 16 percent of the site. This is twice the minimum standard required by F.H.A. (10).

A city park, located one-quarter mile west on Griffith Drive, will serve as an active recreation area for school age

children. The Tuttle Creek Reservoir, located four miles north of the site, presents an ideal family recreation area.

Laundry Facilities

The laundry building is located in the center of the site and is accessible to all spaces. The maximum walking distance to any space is 600 feet and all walks are paved. Nine parking spaces are provided for residents who prefer to drive.

Five coin-operated washers and dryers are provided based on Mobile Home Manufacturers Association's recommended range of sixteen and one-half to twenty families per washer/dryer. Many late model mobile homes are equipped with washers and dryers, however, this trend does not offset the need for central facilities. Two restrooms are located in the building with access from the inside or outside. A 2,200 square foot drying yard is adjacent to the laundry building (10). The area is surfaced with a three inch compacted layer of clean river washed gravel. A six foot redwood board-on-board fence screens the yard completely from view, yet allows air circulation.

An outdoor lounging area is located adjacent to the west side of the building consisting of a concrete patio, redwood benches and plant material. It is enclosed on three sides and opens toward the children's play area. Windows line the wall of the building so that the machines can be viewed from the patio.

Utilities

Electrical distribution is installed underground for esthetic reasons and for safety. The high density of the park would require a maze of overhead wires and poles that would present hazards from adverse weather and would interfere with necessary tree cover. Although no definite local information is available, a local representative of The Kansas Power and Light Company has indicated that the developer would be required to pay the difference in cost between overhead and underground installation. The system will consist of 100 ampere 120/240 volt service to each space and individual meters (16). Telephone lines will also be laid underground.

Water will be supplied by the city water system. The water system will consist of piping capable of supplying six gallons per minute at a minimum pressure of twenty pounds per square inch at each mobile home space. There will be at least 180 gallons per minute available to the park (10).

The sewerage system will be designed to provide for a minimum flow of 125 gallons per day per mobile home and will empty into a municipal sewerage main. The sewer lines will be placed at a grade that will insure a velocity of two feet per second when flowing full. Manholes will be provided at each change in grade or direction, junction of two or more main lines and at intervals of not more than 400 feet (10). Each space is equipped with a four inch connection as shown in Fig. 4, Plate VI.

Garbage and trash collection areas are located for convenient pick-up and serve a maximum of eight spaces each. An example is shown in Fig. 3, Plate V. Metal containers with lids are used and screens are employed to block the areas from view. A local private firm will be contracted for collection and disposal.

General Cost Estimate

The following cost estimate is based on the National Construction Estimator (7), Building Construction Cost Data (11), Preliminary Working Drawings, Specifications and Cost Outline for a Mobile Home (6) and information obtained from local individuals. It is meant to give a general indication of costs and is not a part of a contract document. It should be noted that the itemized cost figures do not include overhead, profit or contingencies. These costs should be added when calculating estimates for items to be subcontracted.

Land cost is not included in the estimate.

Return on Investment

The figures in Table 3 are based on information compiled and analyzed from comprehensive questionnaires gathered from a number of mobile home parks located in several western states (24). Various schedules are shown in Table 4 to determine the rental charge necessary to pay for the development and gain a reasonable return on the investment. Depreciation was figured on a twenty year schedule (24).

Table 2. Cost estimate.

Item	Description	Quan.	Unit cost	Cost per space	Total cost
Earthwork	Rough grading by machine	7,315 cy	0.42/cy		$ 3,100.
Storm Sewers	21" pipe	500 lf	5.50/lf		2,750.
	24" pipe	467 lf	6.50/lf		3,000.
	27" pipe	155 lf	7.50/lf		1,150.
	Catch basins with drop inlets	5	456.ea.		2,300.
	Drop inlets	10	150.ea.		1,500.
Paving	Streets-24'x6" Portland Cement Conc.	9,171 sy	4.85/sy		44,500.
	Curb and gutter	4,907 lf	1.55/lf		7,600.
	Parking bays-5" Portland Cement Conc.	3,171 sy	4.50/sy		14,300.
	Parking bay curbs	4,004 lf	1.06/lf		4,250.
	Walks-4'x4" conc. and gravel base	1,891 sy	4.10/sy		7,750.
Site Planting	Trees-2-3" caliper	100	40.		4,000.
	Trees-6-8' height	206	10.		2,050.
	Fine grading, seeding and fertilizer	288,435 sf	1.128/sf		8,050.
Structures	Laundry building	800 sf			12,000.
	Drying yard 3" gravel	20 cy	3.70 cy		70.
	Poles and lines				70.
	Outdoor lounge				120.
	Plantings				190.
	Office building	700 sf			8,000.
	Plantings				180.

Table 2 (concl.).

Item	Description	Quan.	Unit cost	Cost per space	Total cost
Space Features	Patios (4" concrete)	460 sf	0.50/sf	230.	$19,100.
	Steppers @ 48"x18"x4" ea.	57 lf	0.95/lf	55.	4,400.
	Wheel runners @ 18"x50' x6" ea.	150 sf	0.70/sf	105.	8,700.
	Fences and screens @ 7' height	54 lf	3.25/sf	175.	14,600.
	Shrubs	24	3.06 ea.	70.	6,000.
Utilities	Electricity			67.	5,550.
	Telephone				No charge
	Water			174.	14,450.
	Sewer			96.	8,000.
	Gas			82.	6,800.
Miscellaneous	Garbage containers and screens				550.
	Street & walk lighting				6,000.
	Street monuments	8	20.ea.		160.
	Sign & directory				300.
	Mail boxes	84	4.ea.		330.
	Playlot fencing & equipment				450.
Sub total					$222,300.
Overhead and profit (approximated at 25%)					55,600.
Contingencies (approximated at 2%)					4,450.
Complete professional services (7.2%)					16,000.
Total				3,400.	$282,400.

Table 3. Annual expenses.

Item	Amount
Salaries and wages	5,000.
Advertising	550.
Association dues	83.
Insurance	665.
Legal and accounting	225.
Office expenses	250.
Repairs and maintenance	2,500.
Services purchased	125.
Supplies	300.
Taxes--land and building	2,200.
--other	100.
Utilities--gas, water, electric	1,335.
--telephone	200.
Other	1,080.
Total	14,613.

Table 4. Annual income.

Rent per month	Laundry income	Gross income	Annual expenses	Depreciation	Income before taxes	Percentage on investment
35	850	33,619	14,613	14,120	4,886	1.7
40	850	38,300	14,613	14,120	9,567	3.4
45	850	42,981	14,613	14,120	14,248	5.0
50	850	47,661	14,613	14,120	18,928	6.7
55	850	52,343	14,613	14,120	23,610	8.4

SUMMARY

Mobile homes are, and will continue to be, an important form of housing in the United States. Urban planning should provide satisfactory controls for their inclusion in the community. A sound design approach by landscape architects and other planners, as illustrated in this study, will provide an attractive, functional environment for mobile home residents.

The park will then be an asset to the community in which it is located.

ACKNOWLEDGEMENTS

The author wishes to thank Professor L. R. Quinlan for his guidance in the preparation of this thesis. Appreciation is expressed to Dr. Robert P. Ealy, Professor Herrick H. Smith and Professor Donald D. White for their cooperation and assistance. The author also wishes to thank his wife, Marilyn, for her efforts and encouragement.

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APPENDIX

PLANS SUBMITTED

The following plans are respectfully submitted as a part of this thesis:

I General Plan. This presentation plan illustrates the design of the complete project and depicts the general character of the park.

II Plot Plan. The dimensions and location of the elements of the park are shown on this plan. A key map of the northeast section of Manhattan, Kansas, is included to show the location of the site and the existing zoning pattern. A description of each zone is given. A plat of the site and a table of physical data concerning the proposed park are also shown.

III Planting Plan. The general tree and shrub plantings are illustrated. Each plant or group of plants is identified by a symbol and abbreviation which is explained in the plant list. Enlarged plans of the office and laundry building grounds are shown.

IV Grading Plan. A contour interval of one foot was used to indicate general rough grading. Finish grading and construction is controlled by means of spot elevations. Typical details of the drainage system are included.

V Detail Sheet. A typical group of units is enlarged to illustrate various arrangements used throughout the park. Examples of patio sizes and forms, screening, walks, plantings and floor plans are shown. An individual space is presented in plan and perspective to further detail this basic element of

the Park.

VI Detail Sheet. Typical details for street and walk construction and for location of utilities on the individual spaces are illustrated. These drawings are intended to show the scope of this study and the quality of the proposed design.

All plans were presented on twenty inch by thirty inch heavyweight, cold press surface, number 100 Crescent Illustration Board. India ink and pencil were used to render the plans, and colored pencil was employed in the presentation of the general plan.

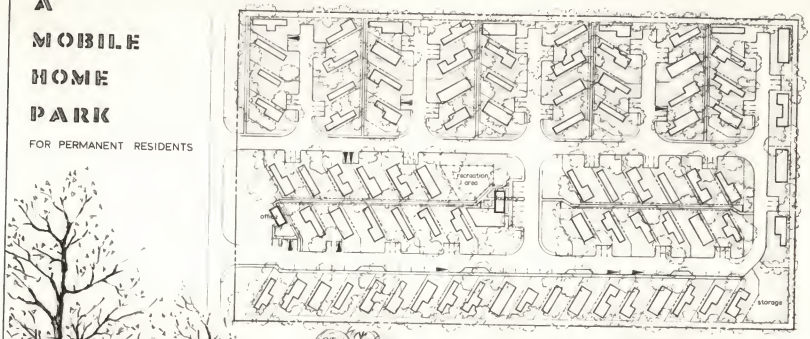
All plans of the total proposed project were drawn to a scale of one inch equals fifty feet. Detail elements were drawn to scale as indicated.

EXPLANATION OF PLATE I

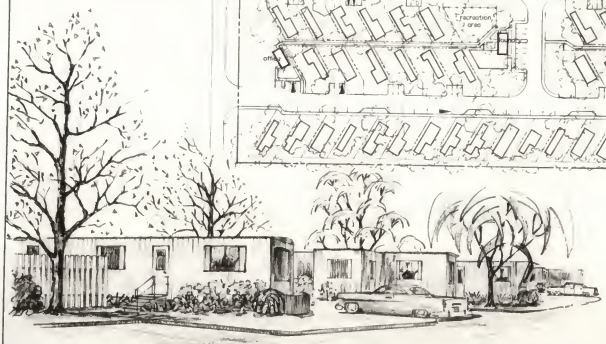
General plan and character sketch.

A MOBILE HOME PARK

FOR PERMANENT RESIDENTS



GENERAL PLAN
SCALE 1"=50'-0"
0' 25' 50' 100' 150'
NORTH



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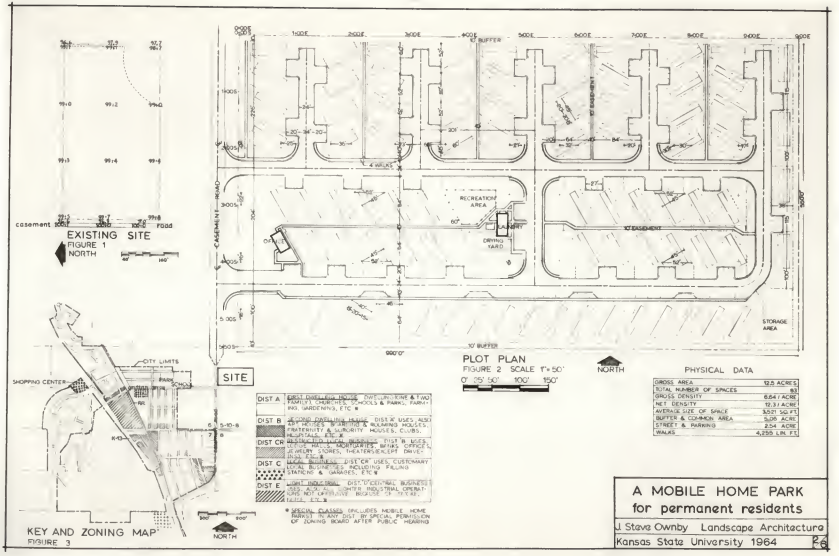
EXPLANATION OF PLATE II

Plot plan, key map, zoning pattern and plat of the site.


EXISTING SITE
FIGURE 1
NORTH
PLOT PLAN
FIGURE 2 SCALE 1"= 50'
NORTH
PHYSICAL DATA
GROSS AREA 12.5 ACRES
TOTAL NUMBER OF SPACES 83
GROSS DENSITY 6.64 / ACRE
NET DENSITY 12.3 / ACRE
AVERAGE SIZE OF SPACE 3,521 SQ. FT.
BUFFER & COMMON AREA 5.09 ACRE
STREET & PARKING 2.54 ACRE
DRIVES 4,255 LIN. FT.
RECREATION AREA
DRIVING YARD
STORAGE AREA
4' WALKS
10' BUFFER
10' EASEMENT
SITE
CITY LIMITS
SHOPPING CENTER
KEY AND ZONING MAP
FIGURE 3
NORTH
DIST A
DIST B
DIST CR
DIST C
DIST E
* SPECIAL CLASSES INCLUDES MOBILE HOME PARKS IN ANY DIST BY SPECIAL PERMISSION OF ZONING BOARD AFTER PUBLIC HEARING
A MOBILE HOME PARK
for permanent residents
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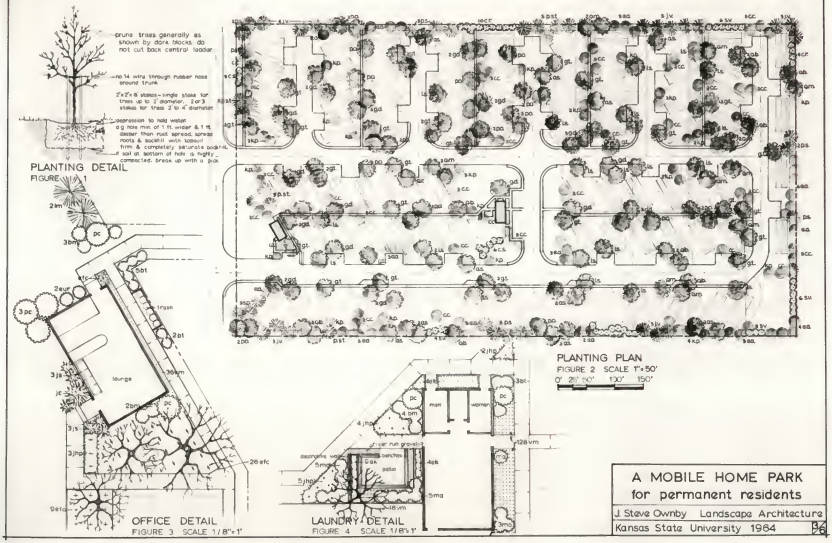
26

EXPLANATION OF PLATE III

General and detailed planting plans.


PLANTING DETAIL
FIGURE 1
PLANTING PLAN
FIGURE 2 SCALE 1"=50'
0' 2½' 50' 100' 150'
OFFICE DETAIL
FIGURE 3 SCALE 1/8"=1'
LAUNDRY DETAIL
FIGURE 4 SCALE 1/8"=1'
A MOBILE HOME PARK
for permanent residents
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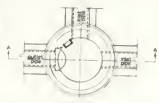
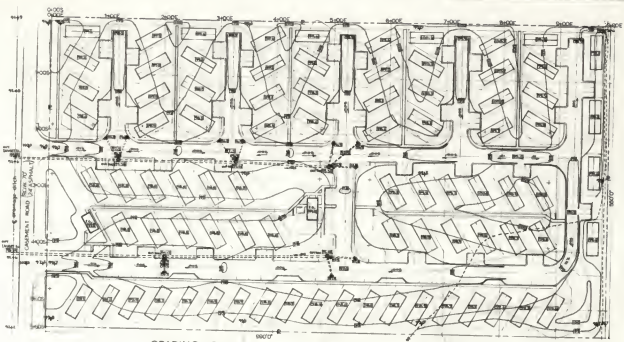
B6

EXPLANATION OF PLATE IV

Grading plan and drainage system details.



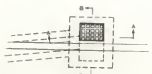
CATCH BASIN DETAILS
FIGURE 1 SCALE 1/2"=1'0"



GRADING PLAN
FIGURE 2 SCALE 1"=50'0"

LEGEND

EXISTING CONTOURS	
PROPOSED CONTOURS	
EXISTING SPOT ELEVATIONS	963
PROPOSED SPOT ELEVATIONS	963
CATCH BASIN	
CURB INLET	
DROP INLET	
STORM SEWER SYSTEM	
SLOPE IN FEET PER FOOT	



CURB INLET DETAILS
FIGURE 3 NO SCALE

A MOBILE HOME PARK
for permanent residents

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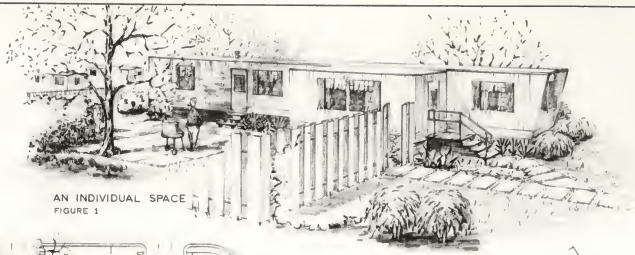
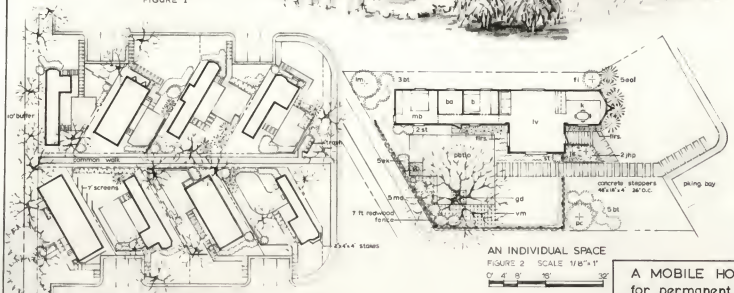
EXPLANATION OF PLATE V

Details of an enlarged block and individual space.



AN INDIVIDUAL SPACE
FIGURE 1



TYPICAL TREATMENT OF SPACES
FIGURE 3 SCALE 1"= 20'

AN INDIVIDUAL SPACE
FIGURE 2 SCALE 1/8"= 1'

A MOBILE HOME PARK
for permanent residents

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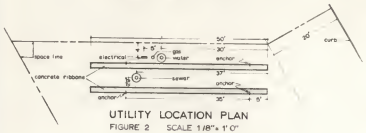
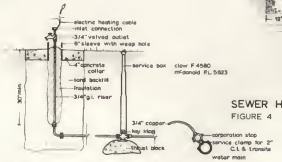
EXPLANATION OF PLATE VI

Details of streets, walks and utilities and a typical space cross section.

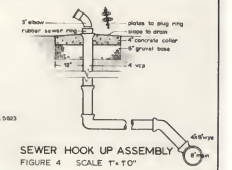
TYPICAL SPACE CROSS SECTION
FIGURE 1 SCALE 1/2"= 1'0"



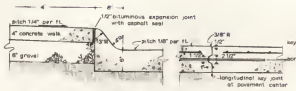
UTILITY LOCATION PLAN
FIGURE 2 SCALE 1/8"= 1'0"



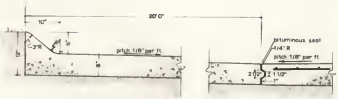
WATER SERVICE AND PIPE CONNECTION
FIGURE 3 SCALE 1"= 1'0"



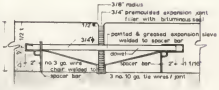
SEWER HOOK UP ASSEMBLY
FIGURE 4 SCALE 1"= 1'0"


pitch 1/4" per ft.
4" concrete walk
6" gravel
1/2" bituminous expansion joint with asphalt seal
pitch 1/8" per ft.
3/8" R
1/2"
key formed of 18 ga metal or premoulded asphalt mastic
bonded tie bars 1/2"ø x 2'6" on 2'6" centers
longitudinal key joint at pavement center

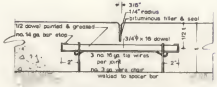
TRANSVERSE SECTION OF WALK AND STREET
FIGURE 5 SCALE 1 1/2"= 1'0"



TRANSVERSE SECTION OF PARKING BAY
FIGURE 6 SCALE 1 1/2"= 1'0"



TRANSVERSE DOWELED EXPANSION JOINT
FIGURE 7 SCALE 3"= 1'0"



TRANSVERSE DOWELED CONTRACTION JOINT
FIGURE 8 SCALE 3"= 1'0"

A MOBILE HOME PARK
for permanent residents

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PLANT LIST

Symbol	Quan.	Botanical & common names	Size & remarks
		Evergreen Trees	
j.v.	18	Juniperus virginiana Eastern Redcedar	3' - 4' B & B
p.s.	15	Pinus sylvestris Scotch Pine	3' - 4' B & B
p.st.	12	Pinus strobus Eastern White Pine	3' - 4' B & B
		Large Deciduous Trees	
a.s.	15	Acer saccharum Sugar Maple	6' - 8'
g.t.	30	Gleditsia triacanthos, H. V. Moraine Honeylocust	2" - 3" Caliper
g.d.	29	Gymnocladus dioicus Kentucky Coffeetree	2" - 3" Caliper
l.s.	21	Liquidamber styraciflua American Sweetgum	2" - 3" Caliper
p.o.	22	Platanus occidentalis American Planetree	2" - 3" Caliper
q.b.	12	Quercus borealis Northern Red Oak	6' - 8'
q.m.	12	Quercus macrocarpa Bur Oak	6' - 8'

PLANT LIST (cont.)

Symbol	Quan.	Botanical & common names	Size & remarks
		Small Deciduous Trees	
c.c.	49	Cercis canadensis Eastern Redbud	6' - 8'
e.a.	37	Elaeagnus angustifolia Russianolive	6' - 8'
k.p.	29	Koelreuteria paniculata Panicled Goldraintree	6' - 8'
		Broadleaf Evergreens	
e.f.c.	49	Euonymus fortunei radicans, H. V. Euonymus Coloratus	Gal. can
e.k.	428	Euonymus kiautschovicus, H. V. Small Leaf Patens Euonymus	12" - 15" B & B
e.u.r.	11	Euonymus fortunei radicans, H. V. Upright Radicans Euonymus	18" - 24" B & B
m.a.	429	Mahonia aquifolium Oregongrape	
p.c.	90	Pyracantha coccinea Scarlet Firethorn	18" - 24" B & B
v.m.	182	Vinca minor Common Periwinkle	2" Pots

PLANT LIST (concl.)

Symbol	Quan.	Botanical & common names	Size & remarks
		Deciduous Shrubs	
b.m.	9	Berberis mentorensis Mentor Barberry	18" - 24"
b.t.	674	Berberis thunbergi Japanese Barberry	15" - 18"
c.r.	24	Cornus racemosa Gray Dogwood	18" - 24"
c.s.	10	Cornus stolonifera Redosier Dogwood	18" - 24"
e.al.	415	Euonymus alatus, H. V. Dwarf Winged Euonymus	15" - 18"
f.i.	83	Forsythia intermedia Border Forsythia	18" - 24"
l.m.	85	Lonicera morrowi Morrow Honeysuckle	18" - 24"
s.t.	249	Spirea thunbergi Thunberg Spirea	15" - 18"
s.v.	19	Syringa vulgaris Common Lilac	18" - 24"

A MOBILE HOME PARK FOR PERMANENT RESIDENTS

by

J. STEVE OWNBY

B. S., Oklahoma State University, 1961

AN ABSTRACT OF A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Landscape Architecture
College of Architecture and Design

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1964

The purpose of this study is to show that mobile homes, properly located in a well planned mobile home park, can provide an attractive, functional home for residents. The mobile home park can also be an asset to the community in which it is located. "Permanent residents" are defined by the mobile home industry as those persons who reside in one location for one year or longer.

The history, present status and expectations of the industry are presented to illustrate the need for this study and the impact of this form of housing in the United States. Public attitudes and popular fallacies are discussed. Methods of zoning mobile home parks are presented and the influence of proper planning and design is emphasized.

The design of parks is explained as it applies to a specific site. The site chosen for the study is a twelve and one-half acre tract immediately outside the city of Manhattan, Kansas.

Adequate pedestrian and vehicular circulation is basic to the study. For example, the size of the units has a marked influence on corner radii and the orientation of the lot to the street. Parking is grouped in small bays, each of which serves two lots. Foot traffic is served primarily by common walks through the interior of the blocks.

The grading and drainage requirements were exacting due to the flat site which had an average slope of only 0.7 foot per 100 feet. The ground surface was manipulated to reach the

minimum slopes required and to create a series of drainage areas, most of which are emptied into a storm sewer system.

Examples of individual spaces are presented to show a variety of treatments and to illustrate the character of the park. The developer is responsible for fencing and screening, paved patios, walks, turf, shrubs, trees and utilities for each lot as well as common laundry and recreation facilities.

The average lot size is 3,521 square feet which is larger than the normal 2,000 to 2,500 square feet. It is felt that the small lot common to most parks will become obsolete as the number of expandable and double width units of greater length increases.

There is a total of eighty-three mobile homes in the park and the gross density is 6.64 units per acre. A general cost estimate is included and estimated income and expenses are calculated to illustrate the return an owner might expect on his investment.